UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/649,924	08/28/2003	Radhakrishna Channegowda	SC13020IC	6120

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ART UNIT	PAPER NUMBER
2616	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

		Application No.	Applicant(s)
Office Action Summary		10/649,924	CHANNEGOWDA ET AL.
		Examiner	Art Unit	
		Man Phan	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>28 August 2003</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,8-10,13-18 and 21-30* is/are rejected.

7)☒ Claim(s) *5-7,11,12,19 and 20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date <u>8/28/03</u>.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____ .

DETAILED ACTION

1.   The application of Channegowda et al. for the "Data traffic manager and method thereof"

filed 08/28/2003 has been examined.   Claims 1-30 are pending in the application.

2.   The applicant should use this period for response to thoroughly and very closely proof

read and review the whole of the application for correct correlation between reference numerals

in the textual portion of the Specification and Drawings along with any minor spelling errors,

general typographical errors, accuracy, assurance of proper use for Trademarks ^{TM}, and other

legal symbols @, where required, and clarity of meaning in the Specification, Drawings, and

specifically the claims (i.e., provide proper antecedent basis for "the" and "said" within each

claim). Minor typographical errors could render a Patent unenforceable and so the applicant is

strongly encouraged to aid in this endeavor.

Claim objections

3.   Claim 8 is objected to because of the following informalities: on line 2, the "UBR" should

be spelled out the first time in the claims. Appropriate correction is required.

4.   Claim 27 should depend from claim 26 instead of 25 as recited.

Claim 28 should depend from claim 27 instead of 26 as recited.

Claim 29 should depend from claim 28 instead of 27 as recited.

Claim 30 should depend from claim 27 instead of 28 as recited.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

5.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6.   This application currently names joint inventors. In considering patentability of the

claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

claims was commonly owned at the time any inventions covered therein were made absent any

evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c)

and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7.   Claims 1-4, 8-10, 13-15 and 26-27, 30 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Petty (US#6,621,792) in view of Fan et al. (US#6,389,019).

With respect to claims 1-4, 8, the references disclose a novel system and method for

traffic management system in ATM utilizing time based transmission queues, according to the

essential features of the claims. Petty (US#6,621,792) discloses in Fig. 1 a block diagram

illustrated a traffic shaping for a plurality of streams of traffic (e.g. ATM virtual circuits or other

packetized channels) utilizes a sequence of a first plurality of queues that are shared by the

plurality of traffic streams, an enqueuing arrangement, and a dequeuing arrangement. Each of
the traffic streams has at least one of the queues designated as its serving queue. Dequeuing is
effected by cyclically transmitting contents of the sequence of the queues, i.e., by transmitting
the contents of a different sequential one of the queues during each sequential period of the first
plurality of such periods. During each period, a queue having a fixed offset in the sequence from
the queue whose contents are being transmitted forms a current queue for that period.
Preferably, the offset is zero, i.e., the current queue is the one whose contents are being
transmitted. Enqueuing is effected as follows. In response to receipt of traffic (e.g., an ATM
cell or another packet) from any of traffic stream during a period before a serving queue of that
traffic stream becomes the current queue for that period, the received traffic is stored in that
serving queue of that traffic stream. In response to receipt of traffic from any the traffic stream
during a period when a serving queue of that traffic stream is the current queue for that period,
the received traffic is stored in the current queue for that period. In response to receipt of traffic
from any of traffic stream during a period after a serving queue of that traffic stream ceased
being the current queue for that period, the received traffic is stored in the current queue for that
period, and the designation of the at least one serving queue of that traffic stream is changed to
designate the current queue of that period as a serving queue of that traffic stream. If a traffic
stream has a plurality of serving queues, they are evenly spaced apart in the sequence of queues.
The designation of the serving queues is then changed by shifting the designation from each of
the serving queues a same distance in the sequence, to other queues that include the current
queue. The shifting preferably involves shifting the designation a distance in the sequence from
the serving queue of that traffic stream that last ceased being the current queue to the current

queue, and shifting the designation from each of the other serving queues of that traffic stream a same distance to another queue (Col. 3, lines 9 plus and Col. 5, lines 1 plus).

However, Petty (US#6,621,792) does not expressly disclose a time spaced round robin scheduler for scheduling cells of data from the shaper queues. It's noted that in traffic shaping, all VCs that require a constant bit rate may be fed into the round robin with the highest priority, and all VCs that require a real time variable bit rate may be fed into the round robin with the next highest priority, and so on. By way of further example, all VCs carrying voice traffic may be fed into the round robin with the highest priority, and all VCs carrying video traffic may be fed into the round robin with the next highest priority. However, the round robin scheduler can be based on any type of QoS criteria other than priority. In the same field of endeavor, Fan et al. (US#6,389,019) teaches in Fig. 2 a block diagram of the scheduler architecture which shapes a large number of streams according to rate values computed dynamically based on switch congestion information. To handle a large range of bit rates, a plurality of timewheels are employed with different time granularities. The streams are assigned dynamically to the timewheels based on computed rate values. The shaper architecture and method support priority levels for arbitrating among streams which are simultaneously eligible to transmit. As shown in Fig. 2, the control memory 4 stores per queue information such as the timestamp value, rate and size of each stream queue. Rate computation unit 8 computes the rate for each stream queue based on external rate information and information stored in control memory 4. Timestamp computation unit 7 calculates the timestamp value for each queue. Stream queues are scheduled by means of scheduling memory 5A, which assumes the form of a timewheel data structure. Ready List 9A contains a prioritized list of stream queues to be serviced. The ready list is

explained in more detail later in the specification. Timestamp computation unit 7, scheduling

memory 5A and ready list 9A are all controlled and coordinated by scheduler logic unit 6 (Col.

6, lines 3 plus and Col. 8, lines 42 plus).

Regarding claim 8, Petty further teaches in Fig. 1 a portion of a traffic management

apparatus that may be used to facilitate an exchange of ATM information, in which a connection

called a "virtual circuit" may be formed between the devices. Moreover, different virtual circuits

may be associated with different quality of service categories. For example, one virtual circuit

may exchange information at a Constant Bit Rate (CBR) while another exchanges information at

an Unspecified Bit Rate (UBR). As shown in Fig. 1, the shaper block 210 determines when a

particular ATM cell in those queues will be transmitted. For example, the shaper block 121 may

determine that a first ATM cell in a CBR virtual circuit queue will be transmitted before a

second ATM cell in a UBR virtual circuit queue (*the scheduler also handles UBR virtual circuit*

queues)(Col. 2, lines 46 plus).

Regarding claims 9-10, Fan further teaches the round-robin (RR) scheduling, in which

the queues are visited in cyclic order and a single cell is served when a visited queue is not

empty. However, if all queues are backlogged, the bandwidth is divided equally among the

queues. This may not be desirable, however, because queues may be allocated different portions

of the common link bandwidth. In weighted round-robin (WRR) scheduling, which was

described in a paper by Manolis Katevenis, et al., entitled, "Weighted Round-Robin Cell

Multiplexing in a General Purpose ATM Switch Chip," IEEE Journal on Selected Areas in

Communications, Vol. 9, No. 8, pp. 1265-1279, October 1991, each queue (connection or class

queue) is assigned a weight. WRR aims to serve the backlogged queues in proportion to the

assigned weights. WRR is implemented using counters, one for each queue. The counters are

initialized with the assigned weights. A queue is eligible to be served if it is not empty and has a

positive counter value. Whenever a queue is served, its counter is decreased by one (to a

minimum of zero). Counters are reset with the initial weights when all other queues are either

empty or have zero counter value. One problem with this counter-based approach is that the rate

granularity depends on the choice of frame size (i.e., the sum of weights).

Regarding claims 13-15, Petty further teaches in the traffic shaper, with a time-bin

implementation of the calendar queue, regulates cell admission into the queues according to the

standard Generic Cell Rate Algorithm (GCRA) *(for example, the standard leaky-bucket*

regulator- Traffic shaper is a variation of a leaky bucket algorithm or general cell rate

algorithm (GCRA) as known in the art) on a per-connection basis (Col. 2, lines 36 plus). A

traffic shaper determines whether an arriving cell conforms to its connection's traffic parameters

or descriptors using any of a variety of algorithms known in the art, the most common of which

is the generic cell rate algorithm (GCRA) from the ATM Forum. The GCRA computes

conformance based on a connection's shaping rate and burstiness and when the last cell arrived at

the shaper from that connection. For a more detailed discussion of a time-bin implementation of

the calendar queue and the Generic Cell Rate Algorithm, see, for example, J. Rexford et al.,

"Scalable Architectures for Traffic Shaping and Link Scheduling in High-Speed ATM

Networks," IEEE J. Select. Areas Commun. (June 1997) and ATM Forum Technical Committee,

"Traffic Management Specification," version 4.0, the ATM Forum, Foster City, Calif. (1995).

With respect to claims 26-27, 30, they are method claims corresponding to the apparatus claims 1-4 and 8 as discussed in paragraph above. Therefore, claims 26-27, 30 are analyzed and rejected as previously discussed with respect to claims 1-4, 8.

One skilled in the art of communications would recognize the need for a time based transmission queue for traffic management system of ATM virtual circuits, and would apply Fan's novel use of the timewheel scheduling with different time granularities into Petty's traffic shaper of the ATM cell constructor. Therefore, It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to apply Fan's time-based scheduler architecture and method for ATM networks into Petty's computationally efficient traffic shaper with the motivation being to provide a system and method for a time spaced data traffic management system in ATM network.

8.   Claims 16-18 and 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Petty (US#6,574,220) in view of Fan et al. (US#6,389,019) as applied to the claims above, and further in view of Ganmukhi et al. (US#5,850,399).

Regarding claims 16-17, 24, 25, Petty (US#6,574,220) and Fan et al. (US#6,389,019) disclose the claimed limitations discussed in paragraph 7 above. However, these claims differ from the claims above in that the claims requires the use of second scheduler for scheduling cells of data from the shaper queues for transmission. In the same field of endeavor, Ganmukhi et al. (US#5,850,399) provide a hierarchical scheduler includes a first level of schedulers that matches a plurality of sessions having various Quality of Service (QoS) requirements with different schedulers which are best suited for a particular QoS class. A second level scheduler then

schedules the outputs from certain ones of the first level schedulers. A third level scheduler

schedules the remaining outputs the first level schedulers with the outputs from the second level

scheduler to provide a hierarchical scheduler output. The hierarchical scheduler apportions

bandwidth among sessions having different requirements in a fair and efficient manner according

to the QoS requirements of the respective sessions. The scheduler accepts traffic types at its

input, and provides an output suitable for scheduling cell based traffic such as Asynchronous

Transfer Mode (ATM) network traffic (Col. 2, lines 39 plus).

Regarding 18, Petty further teaches in the traffic shaper, with a time-bin implementation

of the calendar queue, regulates cell admission into the queues according to the standard Generic

Cell Rate Algorithm (GCRA) *(for example, the standard leaky-bucket regulator- Traffic shaper*

is a variation of a leaky bucket algorithm or general cell rate algorithm (GCRA) as known in the

art) on a per-connection basis (Col. 2, lines 36 plus). A traffic shaper determines whether an

arriving cell conforms to its connection's traffic parameters or descriptors using any of a variety

of algorithms known in the art, the most common of which is the generic cell rate algorithm

(GCRA) from the ATM Forum. The GCRA computes conformance based on a connection's

shaping rate and burstiness and when the last cell arrived at the shaper from that connection. For

a more detailed discussion of a time-bin implementation of the calendar queue and the Generic

Cell Rate Algorithm, see, for example, J. Rexford et al., "Scalable Architectures for Traffic

Shaping and Link Scheduling in High-Speed ATM Networks," IEEE J. Select. Areas Commun.

(June 1997) and ATM Forum Technical Committee, "Traffic Management Specification,"

version 4.0, the ATM Forum, Foster City, Calif. (1995).

Regarding claims 21-23, Ganmukhi further teaches a Weighted Round Robin (WRR) scheduler 40 is used for scheduling the nrtVBR packets since this class does not have stringent delay requirements and only expects the network to guarantee their specified minimum throughput, while being inexpensive to implement. For the same reasons, a second WRR scheduler 50 is used to schedule ABR packets and a third WRR scheduler 60 is used to schedule UBR+ packets. For the UBR class 24 a simple round robin (RR) scheduler 70 is used since all the UBR sessions should be treated equally. Further, this scheduling hierarchy gives the network operator the flexibility to allocate any amount of bandwidth to support the UBR connections. RR schedulers are also inexpensive to implement. At the second level of hierarchy a second MSTCFQ+ scheduler 80 is used. This scheduler 80 schedules between the first MSTCFQ+ scheduler output 32, the WRR schedulers outputs 42, 52 and 62, and the RR scheduler output 72. The MSTCFQ+ scheduler is again utilized due to its effective tradeoff between performance and complexity as well as being inexpensive to implement as compared to schedulers offering similar performance. The static priority scheduler 90 gives the output 22 from the CBR shaper 20 the highest priority and the rtVBR, nrtVBR, ABR, UBR+ and UBR as a group priority below the CBR class. The CBR shaper 20 is responsible for per-Virtual Circuit (VC) shaping and is work non-conserving in that the CBR shaper 20 will allocate bandwidth whether or not it has cells pending. As such, the CBR shaper 20 wastes bandwidth if no cells are pending. Accordingly, the CBR class is given the highest priority while the delay sensitive queues are given the next highest priority (Col. 4, lines 53 plus).

One skilled in the art of communications would recognize the need for a time based transmission queue for traffic management system of ATM virtual circuits, and would apply

Ganmukhi's scheduling the classes with second level scheduler and prioritizing among the

outputs, and Fan's novel use of the timewheel scheduling with different time granularities into

Petty's traffic shaper of the ATM cell constructor. Therefore, It would have been obvious to a

person of ordinary skill in the art at the time of the invention was made to apply Ganmukhi's

hierarchical packet scheduling method and apparatus, and Fan's time-based scheduler

architecture and method for ATM networks into Petty's computationally efficient traffic shaper

with the motivation being to provide a system and method for a time spaced data traffic

management system in ATM network.

Allowable Subject Matter

9.   Claims 5-7, 11-12, 19-20 and 28-29 are objected to as being dependent upon the rejected

base claims, but would be allowable if rewritten in independent form including all of the

limitations of the base claims and any intervening claims.

10.   The following is an examiner's statement of reasons for the indication of allowable

subject matter: The closest prior art of record fails to disclose or suggest wherein for each class,

there are 'n' shaper queues of size 's', wherein n and s are different for each class depending on a

granularity and a total number of queues available, and wherein each shaper queue within a class

is serviced cyclically for 's' ticks in a cycle of n*s ticks; wherein the enqueue engine manages

the shaper queues with a threshold tail drop mechanism and protects queue availability for

conformant cells; wherein the enqueue engine discards a cell that has to be delayed beyond a

predetermined time period, as specifically recited in the claims.

11.   Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

12.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The Haddock et al. (US#6,104,700) is cited to show the policy-based QoS.

The Petty (US#6,574,220) is cited to show the traffic shaper that accommodates maintenance cells without causing jitter or delay.

The Venkatachalam et al. (US#2005/0010676) is cited to show the time-based transmission queue for traffic management of ATM Virtual Circuits on a multi threaded.

The Lincoln (US#6,005,866) shows the scheduler utilizing dynamic schedule table.

The Graves et al. (US#6,229,788) is cited to show the method and apparatus for traffic shaping in a broadband fiber-based access system.

The Chow et al. (US#6,438,134) is cited to show the two-component bandwidth scheduler having application in multi-class digital communications systems.

The Kalkunte et al. (US#2005/0018601) is cited to show the traffic management.

The Sasamori et al. (US#7,161,903) cited how the control station, apparatus and network.

The Parruck et al. (US#6,198,723) is cited to show a ATM traffic shapers.

The Lodha (US#2004/0196788) is cited to show a customer specific traffic shaping.

The Davis (US#6,993,040) is cited to show a adaptive weight assignment for ATM.

The Appala et al. (US#6,862,265) is cited to show a weighted fair queueing

approximation in a network switch using weighted round robin and token bucket filter.

The Parruck et al. (US7,002,916) is cited to show an ATM traffic shapers.

13.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to M. Phan whose telephone number is (571) 272-3149. The

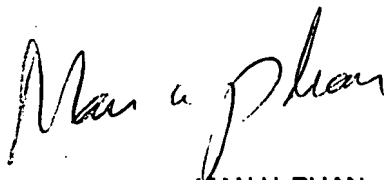examiner can normally be reached on Mon - Fri from 6:00 to 3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Wellington Chin, can be reached on (571) 272-3134. The fax phone number for the

organization where this application or proceeding is assigned is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the receptionist whose telephone number is (571) 272-2600.

14.   Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published

applications may be obtained from either Private PAIR or Public PAIR. Status information for

unpublished applications is available through Private PAIR only. For more information about

the PAIR system, see http://pair-direct.uspto.gov. Should you have any questions on access to

the Private PAIR system, contact the Electronic Business Center (EBC) at toll free 1-866-217-

9197.

Mphan

04/19/2007.

MAN U. PHAN
PRIMARY EXAMINER